

CLAIM

1 1. A dyed flame resistant fabric, comprising:
2 a plurality of melamine fibers;
3 wherein the flame resistant fabric has been dyed through a beam dyeing process in
4 which the fabric has not been mechanically agitated.

1 2. The fabric of claim 1, further comprising a plurality of non-melamine,
2 inherently flame resistant fibers.

1 3. The fabric of claim 2, wherein the non-melamine, inherently flame
2 resistant fibers include aramid fibers.

1 4. The fabric of claim 2, wherein the non-melamine, inherently flame
2 resistant fibers are para-aramid fibers.

1 5. The fabric of claim 2, wherein the non-melamine, inherently flame
2 resistant fibers have been dyed through the beam dyeing process.

1 6. The fabric of claim 2, wherein the fabric is approximately 20% to 75%
2 melamine fibers by composition.

1 7. The fabric of claim 2, wherein the fabric is approximately 30% to 50%
2 melamine fibers by composition.

1 8. The fabric of claim 2, wherein the fabric is approximately 40% melamine
2 fibers by composition.

1 9. The fabric of claim 1, wherein the fabric is a woven fabric.

1 10. The fabric of claim 1, wherein the fabric has a weight of approximately 5
2 oz/yd² to 9 oz/yd².

1 11. The fabric of claim 1, wherein the fabric has a weight of approximately 7.5
2 oz/yd².

1 12. The fabric of claim 1, wherein the fabric has a trapezoidal tear strength of
2 at least approximately 30 lbf. in the warp direction and at least approximately 25 lbf. in
3 the filling direction.

1 13. The fabric of claim 1, wherein the fabric has an L* value no greater than
2 approximately 60.

1 14. The fabric of claim 1, wherein the fabric has an L* value no greater than
2 approximately 35.

1 15. The fabric of claim 1, wherein the fabric has an L* value no greater than
2 approximately 25.

1 16. A dyed flame resistant fabric, comprising:
2 a plurality of dyed melamine fibers; and
3 a plurality of aramid fibers;
4 wherein the flame resistant fabric has been dyed through a beam dyeing process in
5 which the fabric has not been mechanically agitated.

1 17. The fabric of claim 16, wherein the aramid fibers comprise para-aramid
2 fibers.

1 18. The fabric of claim 16, wherein the aramid fibers have been dyed through
2 the beam dyeing process.

1 19. The fabric of claim 16, wherein the fabric is approximately 20% to 75%
2 melamine fibers by composition.

1 20. The fabric of claim 16, wherein the fabric is approximately 30% to 50%
2 melamine fibers by composition.

1 21. The fabric of claim 16, wherein the fabric is approximately 40% melamine
2 fibers by composition.

1 22. The fabric of claim 16, wherein the fabric has a composition of
2 approximately 40% melamine fibers and approximately 60% para-aramid fibers.

1 23. The fabric of claim 16, wherein the fabric is a woven fabric.

1 24. The fabric of claim 16, wherein the fabric has a weight of approximately 5
2 oz/yd² to 9 oz/yd².

1 25. The fabric of claim 16, wherein the fabric has a weight of approximately
2 7.5 oz/yd².

1 26. The fabric of claim 16, wherein the fabric has a trapezoidal tear strength of
2 at least approximately 30 lbf. in the warp direction and at least approximately 25 lbf. in
3 the filling direction.

1 27. The fabric of claim 16, wherein the fabric has an L* value no greater than
2 approximately 60.

1 28. The fabric of claim 16, wherein the fabric has an L* value no greater than
2 approximately 35.

1 29. The fabric of claim 16, wherein the fabric has an L* value no greater than
2 approximately 25.

1 30. A dyed, woven flame resistant fabric suitable for use in the construction of
2 firefighter turnout gear, comprising:

3 a plurality of dyed melamine fibers; and

4 a plurality of dyed para-aramid fibers;

5 wherein the flame resistant fabric has a composition that comprises approximately
6 30% to 50% melamine fibers and approximately 70% to 50% para-aramid fibers;

7 wherein the melamine fibers and the para-aramid fibers have been dyed through a
8 beam dyeing process in which the fabric has not been mechanically agitated.

1 31. The fabric of claim 30, wherein the fabric has a composition of
2 approximately 40% melamine fibers and approximately 60% para-aramid fibers.

1 32. The fabric of claim 30, wherein the fabric has a weight of approximately 5
2 oz/yd² to 9 oz/yd².

1 33. The fabric of claim 30, wherein the fabric has a weight of approximately
2 7.5 oz/yd².

1 34. The fabric of claim 30, wherein the fabric has a trapezoidal tear strength of
2 at least approximately 30 lbf. in the warp direction and at least approximately 25 lbf. in
3 the filling direction.

1 35. The fabric of claim 30, wherein the fabric has an L* value no greater than
2 approximately 60.

1 36. The fabric of claim 30, wherein the fabric has an L* value no greater than
2 approximately 35.

1 37. The fabric of claim 30, wherein the fabric has an L* value no greater than
2 approximately 25.

1 38. A method for dyeing a melamine fabric, comprising the steps of:
2 wrapping the melamine fabric around a perforated beam of a beam dyeing
3 machine such that several layers of fabric surround the beam;
4 injecting dyebath into the beam so that the dyebath penetrates the fabric layers;
5 and
6 circulating the dyebath through the fabric layers until the fabric is dyed to a
7 desired shade.

1 39. The method of claim 38, wherein the melamine fabric comprises a
2 plurality of melamine fibers and non-melamine, inherently flame resistant fibers.

1 40. The method of claim 39, wherein the fabric is approximately 20% to 75%
2 melamine fibers by composition.

1 41. The method of claim 39, wherein the fabric is approximately 30% to 50%
2 melamine fibers by composition.

1 42. The method of claim 39, wherein the fabric is approximately 40%
2 melamine fibers by composition.

1 43. The method of claim 38, wherein the step of wrapping the melamine fabric
2 around the perforated beam comprises wrapping approximately 100 to 1250 yards of
3 fabric around the beam.

1 44. The method of claim 38, wherein the step of wrapping the melamine fabric
2 around the perforated beam comprises wrapping the melamine fabric such that the fabric
3 layers around the beam have a combined thickness of approximately 6 to 25 inches.

1 45. The method of claim 38, wherein the step of injecting dyebath into the
2 beam comprises injecting a neutral aqueous solution into the beam.

1 46. The method of claim 45, wherein the dyebath comprises a disperse dye.

1 47. The method of claim 38, wherein the step of injecting dyebath into the
2 beam comprises injecting a lightly acidic solution into the beam.

1 48. The method of claim 47, wherein the dyebath comprises a combination of
2 disperse and acid dye.

1 49. The method of claim 38, wherein the dyebath includes a dye assistant.

1 50. The method of claim 49, wherein the dye assistant comprises one of aryl
2 ether and benzyl alcohol.

1 51. The method of claim 38, wherein the fabric has a weight of approximately
2 5 oz/yd² to 9 oz/yd².

1 52. The method of claim 38, wherein, through the dyeing process, the fabric
2 attains an L* value no greater than approximately 60.

1 53. The method of claim 38, wherein, through the dyeing process, the fabric
2 attains an L* value no greater than approximately 35.

1 54. The method of claim 38, wherein, through the dyeing process, the fabric
2 attains an L* value no greater than approximately 25.

1 55. A melamine fabric dyed in accordance with the method of claim 38.

1 56. A method for dyeing flame resistant fabric, comprising the steps of:
2 wrapping a flame resistant fabric comprising a plurality of melamine fibers and a
3 plurality of aramid fibers around a perforated beam of a beam dyeing machine such that
4 several layers of fabric surround the beam;
5 injecting dyebath into the beam so that the dyebath penetrates the fabric layers, the
6 dyebath comprising an aqueous solution containing a disperse dye; and
7 circulating the dyebath through the fabric layers until the fabric is dyed to a
8 desired shade.

1 57. The method of claim 56, wherein the fabric is approximately 20% to 75%
2 melamine fibers by composition.

1 58. The method of claim 56, wherein the fabric is approximately 30% to 50%
2 melamine fibers by composition.

1 59. The method of claim 56, wherein the fabric is approximately 40%
2 melamine fibers by composition.

1 60. The method of claim 56, wherein the step of wrapping the fabric around
2 the perforated beam comprises wrapping approximately 100 to 1250 yards of fabric
3 around the beam.

1 61. The method of claim 56, wherein the step of wrapping the fabric around
2 the perforated beam comprises wrapping the melamine fabric such that the fabric layers
3 around the beam have a combined thickness of approximately 6 to 25 inches.

1 62. The method of claim 56, wherein the dyebath comprises a combination of
2 disperse and acid dye.

1 63. The method of claim 56, wherein the dyebath includes a dye assistant.

1 64. The method of claim 63, wherein the dye assistant comprises one of aryl
2 ether and benzyl alcohol.

1 65. The method of claim 56, wherein the fabric has a weight of approximately
2 5 oz/yd² to 9 oz/yd².

1 66. The method of claim 56, wherein, through the dyeing process, the fabric
2 attains an L* value no greater than approximately 60.

1 67. The method of claim 56, wherein, through the dyeing process, the fabric
2 attains an L* value no greater than approximately 35.

68. The method of claim 56, wherein, through the dyeing process, the fabric attains an L* value no greater than approximately 25.

69. A melamine fabric dyed in accordance with the method of claim 56.

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